MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

PMT0075 – ALGEBRA

(All sections/ Groups)

13 OCTOBER 2015
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 5 pages with **FIVE** questions.
2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. **No calculators are allowed**.

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You are required to write proper steps.

Question 1 (10 marks)

a) Simplify the expression and write your final expression as a fraction with no negative exponents.

$\left(49x^2y^{-4}\right)^{-\frac{1}{2}}$ (2 marks)

b) Rationalize the denominator for $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}+\sqrt{3}}$ and simplify. (2 marks)

c) Simplify the expression into a single term:

$-\sqrt{32x^2y^4}+3y\sqrt{50x^2y^2}$ (2 marks)

d) Simplify the following expression:

$\frac{x+3}{x+5}\div\frac{x^2-2x-15}{x^2-25}$ (2 marks)

e) Use a Special Factoring Formula to factorize the following expression completely.

$1+27y^3$ (2 marks)

Continued ...

Question 2 (10 marks)

a) i) Solve $x^2 - 4x - 5 = 0$.

ii) Solve the inequality $x^2 - 4x - 5 \geq 0$.
Give your final answer in interval notation.

iii) Find the domain of the function $g(x) = \dfrac{1}{\sqrt{x^2 - 4x - 5}}$.
Give your final answer in interval notation.

(5 marks)

b) Solve the equation $|2x + 3| > 7$. Give your final answer in interval notation.

(2 marks)

c) Solve $\sqrt{3x + 1} = x - 3$. Remember to check your answers.

(3 marks)

Continued ...

Question 3 (10 marks)

a) Given $f(x) = 3x + 5$ and $g(x) = \dfrac{1}{x-4}$.

i) Find the domains of f and g. Give your final answers in interval notation.

ii) Find $g \circ f$ and the domain of $g \circ f$.
Give your final answer of the domain in interval notation.

iii) Find $f^{-1}(x)$.

(4 marks)

b) When $P(x) = x^2 + 2px + 9$ is divided by $(x+3)$, the remainder is 4.
By using Remainder Theorem, find the value of p.

(1 marks)

c) Given the polynomial function $f(x) = (x+3)^2(x+1)(x-4)$.

i) What is the **degree** of f?

ii) Determine **the zeros** of f **and their multiplicities**.
Also, determine whether the graph of f crosses or touches the x-axis at each zero.

iii) Determine its y-intercept.

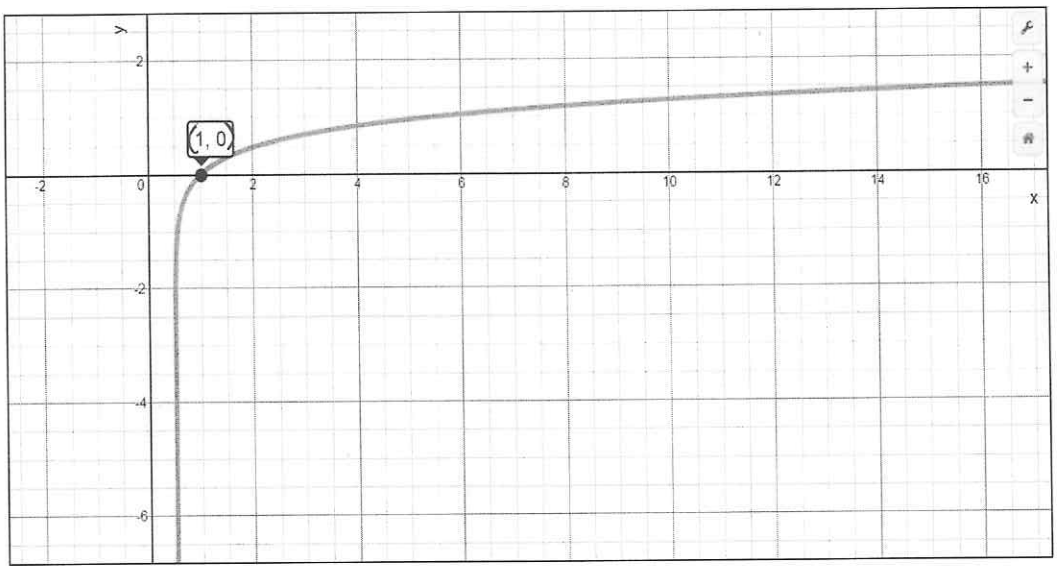
iv) Determine the end behavior of f.

v) Sketch the graph of the polynomial function.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

(5 marks)

Continued ...

Question 4 (10 marks)



a) The figure above shows the graph of function $f(x)=\log_{10}(kx-1)$.

i) Find the value of k.

ii) Write down the domain and range of f.
Give your answers in interval notation.

iii) Is the function a one-to-one function?

(3 marks)

b) i) Use **long division** to find the quotient and remainder when the polynomial function $f(x)=3x^3+11x^2+12x+4$ is divided by $(x+2)$.

ii) Factorize $f(x)$ completely.

iii) Hence, solve $f(x)=0$.

(5 marks)

c) Write down $f(x)=x^2+2x-2$ in standard form $a(x+h)^2+k$ where a, h and k are some constants.
Hence, determine the **vertex** of the parabola $y=x^2+2x-2$.

(2 marks)

Continued ...

Question 5 (10 marks)

a) Rewrite the sum $\sum_{k=1}^{3}\left(k^3+1\right)$ without sigma notation and then evaluate the sum.

(2 marks)

b) The 2^{nd} and 7^{th} term of an arithmetic sequence are 75 and 55 respectively.

i) Find the first term and the common difference.

ii) Find the sum of the first 7 terms.

(3 marks)

c) The common ratio of a geometric sequence is $-\frac{4}{5}$ and the sum to infinity is $\frac{80}{9}$.
Find the first term.

(2 marks)

d) Find the coefficient of x^2y^9 in the expansion of $(2x-y)^{11}$.
Use Binomial Theorem.

(3 marks)

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